

IN THE CLAIMS:

Cancel claims 1-76 without prejudice and replace with claims 77-152, set forth below:

1-76. (Cancelled)

77. (New) A free-jet centrifuge for cleaning the lubricating oil of an internal combustion engine, comprising:

a housing which is closed by a removable cover,

a rotor rotatably arranged in the housing and with channels for feeding pressurized lubricating oil to be cleaned and for removing cleaned pressureless lubricating oil,

the rotor being of split design with a drive part having at least one recoil nozzle and a dirt trapping part having a dirt collection area,

the drive part configured to allow a first partial lubricating oil flow therethrough and the dirt trapping part configured to allow a second partial lubricating oil flow therethrough,

the drive part and the dirt trapping part being configured with positive-interaction torque transmission means which are engageable by axially slipping the dirt trapping part onto the drive part and disengageable by axially pulling the dirt trapping part off from the drive part,

the dirt trapping part being separable from the drive part for disposal or cleaning, and

means located in the centrifuge which, in the operation of the centrifuge, serve to at least restrict the axial mobility of the dirt trapping part relative to the drive part and which are one of ineffective and detachable when the cover is removed,

wherein the drive part extends from a bottom towards a top into the dirt trapping part or entirely through it, the drive part comprises all of the parts necessary for a rotatable bearing of the rotor, and the drive part is securely positioned against axial removal with the cover in an open position.

78. (New) A free-jet centrifuge according to claim 77, wherein the drive part comprises a central tubular body forming a lubricating oil channel and at least one nozzle bearing body radially extending outward from the tubular body with at least one oil branch channel leading to the at least one recoil nozzle.

79. (New) A free-jet centrifuge according to claim 78, wherein the nozzle bearing body has the form of a double bottom, in an interspace of which the at least one oil branch channel is formed.

80. (New) A free-jet centrifuge according to claim 78, wherein the nozzle bearing body has the form of a disk in which the at least one oil branch channel is formed.

81. (New) A free-jet centrifuge according to claim 78, wherein the nozzle bearing body has the form of at least two tubular arms with one oil branch channel running through each arm.

82. (New) A free-jet centrifuge according to claim 77, wherein the rotor is positioned on an axis forming one part of the housing, being rigidly or articulatedly attached on a remaining housing part, said axis penetrating the rotor and being detachably supported and centered with its upper end in the cover when in place.

83. (New) A free-jet centrifuge according to claim 77, wherein the rotor is positioned on an axis forming a rigid part of the housing, the axis extending into the rotor and ending with its upper end at a distance to the cover when in place.

84. (New) A free-jet centrifuge according to claim 77, wherein the rotor is arranged on bearings at a bottom and a top by means of one axis stub each, with the axis stubs being parts of one of the rotor and the housing and its cover.

85. (New) A free-jet centrifuge according to claim 77, wherein the dirt trapping part is formed by a hollow body at least partly open at an axial bottom and an axial top, with a radially outer peripheral wall, wherein axially on the bottom, the nozzle bearing body, in the assembled condition of the rotor, forms a bottom delimiting an interior of the rotor at least partly towards the bottom and with the hollow body, axially on the top, being closed by a separate dirt trapping part cover.

86. (New) A free-jet centrifuge according to claim 77, wherein the dirt trapping part is formed by a cup-shaped hollow body axially open on the top, with a radially outer peripheral wall, with the hollow body, axially on the top, being closed by a separate dirt trapping part cover.

87. (New) A free-jet centrifuge according to claim 77, wherein the dirt trapping part is formed by a bell-shaped hollow body being at least partly open axially on the bottom, with a radially outer peripheral wall, with the nozzle bearing body, axially on the bottom, forming, in an assembled condition of the rotor, a bottom at least partly delimiting an interior of the rotor towards the bottom.

88. (New) A free-jet centrifuge according to claim 77, wherein the dirt trapping part is formed by a can-shaped hollow body closed axially on the bottom and axially on the top, with a radially outer peripheral wall.

89. (New) A free-jet centrifuge according to claim 85, wherein the hollow body forming the dirt trapping part additionally comprises a radially inner tubular wall.

90. (New) A free-jet centrifuge according to claim 77, wherein the interacting torque transmission means of the drive part and dirt trapping part of the rotor are arranged in its radially inner, axially upper area.

91. (New) A free-jet centrifuge according to claim 77, wherein the interacting torque transmission means of drive part and dirt trapping part of the rotor are provided in its axially lower area.

92. (New) A free-jet centrifuge according to claim 81, wherein the dirt trapping part on an underside has a contour axially overreaching the arms of the drive part and forming, with these arms, the interacting torque transmission means of the drive part and the dirt trapping part of the rotor.

93. (New) A free-jet centrifuge according to claim 92, wherein the contour of the underside of the dirt trapping part is additionally designed as a latching connection axially engageable and disengageable with the arms of the drive part.

94. (New) A free-jet centrifuge according to claim 77, wherein the dirt trapping part comprises in its interior guide and stiffener walls which are arranged substantially radially.

95. (New) A free-jet centrifuge according to claim 94, wherein the radially inner end of the guide and stiffener walls forms a part of the torque transmission means on the side of the dirt trapping part, and the interacting torque transmission means of the drive part and the dirt trapping part of the rotor in its radially interior area, are provided extending over at least one part of the axial length of the tubular body.

96. (New) A free-jet centrifuge according to claim 77, wherein the interacting torque transmission means of the drive part and the dirt trapping part are formed by axially combinable and separable multi-edge arrangements comprising one of contours, indentations, waviness and tongue-and-groove-configurations, with or without an undercut as seen in radial direction.

97. (New) A free-jet centrifuge according to claim 96, wherein the interacting torque transmission means of the drive part and the dirt trapping part are designed in a self-finding manner with at least one of lead-in slopes and lead-in points.

98. (New) A free-jet centrifuge according to claim 85, wherein the hollow body forming the dirt trapping part of the rotor is a one-piece plastic injection molded part.

99. (New) A free-jet centrifuge according to claim 85, wherein the hollow body forming the dirt trapping part of the rotor is a plastic component of two injection molded parts joined together.

100. (New) A free-jet centrifuge according to claim 77, wherein a seal member is provided in the contact areas between the drive part and the dirt trapping part of the rotor, the seal member comprising at least one of a separately attached seal, a single-piece integrally molded seal and a sealing contour.

101. (New) A free-jet centrifuge according to claim 77, wherein, for the generation of the two partial lubricating oil flows, the lubricating oil flow being fed to the centrifuge is divided in the centrifuge into two volume-adjusted partial flows, fed via two defined throttle points, with one partial flow being feedable under pressure to the drive part and its recoil nozzle and the other partial flow being feedable without pressure to the dirt trapping part via at least one inlet.

102. (New) A free-jet centrifuge according to claim 101, wherein both throttle points are provided in the drive part of the centrifuge.

103. (New) A free-jet centrifuge according to claim 102, wherein, of the two throttle points, the one through which the partial lubricating oil flow is fed to the dirt trapping part is formed by at least, one of a throttle bore and an upper bearing of the drive part with a defined gap measure.

104. (New) A free-jet centrifuge according to claim 92, wherein the partial flow fed to the drive part is larger by volume than the partial flow fed to the dirt trapping part.

105. (New) A free-jet centrifuge according to claim 82, wherein the supply of the lubricating oil to the centrifuge, for the drive part as well as for the dirt trapping part, is provided axially from the bottom through the axis.

106. (New) A free-jet centrifuge according to claim 82, wherein the supply of lubricating oil to the centrifuge is provided, for the drive part, axially from the bottom through the axis, and for the dirt trapping part, separately thereof axially from the top.

107. (New) A free-jet centrifuge according claim 77, wherein the partial lubricating oil flow for the dirt trapping part is supplied into it in at least one of the following manners: axially on the top, radially from the inside to the outside, in the form of a revolving fan jet and in the form of several individual jets distributed in circumferential direction through at least one correspondingly formed inlet.

108. (New) A free-jet centrifuge according to claim 107, wherein at least one built-in part is provided axially on the top in the dirt trapping part for the uniform distribution of the inflowing lubricating oil in circumferential direction of the dirt trapping part.

109. (New) A free-jet centrifuge according to claim 101, wherein at least one oil outlet is provided axially on the bottom and radially inside on the rotor, said outlet having a cross-section which is larger than a cross-section of the inlet.

110. (New) A free-jet centrifuge according to claim 109, wherein radially outside from the outlet, at least one of a deflecting rib arrangement and a shielding disk is provided, on at least one of the underside of the rotor and on the upper side of a centrifugal housing area located under the rotor, which forces the pressureless partial lubricating oil flow coming from the outlet to a guided course separated from the rotor and from the oil jet coming out of the recoil nozzle.

111. (New) A free-jet centrifuge according to claim 82, wherein the drive part is secured against removal from the axis towards the top by means of a safety which is at least one of latched, clamped and screwed on the axis or one of provided and supported on the cover.

112. (New) A free-jet centrifuge according to claim 77, wherein the dirt trapping part axially on an upper side and the cover axially on an underside each have a stop face which in their interaction at least restrict an axial mobility of the dirt trapping part relative to the drive part when the cover is in place.

113. (New) A free-jet centrifuge according to claim 82, wherein a stop body, detachably connected axially at the top with the axis, projecting above the axis radially towards the outside, has axially on an underside, and the dirt trapping part has axially on an upper side, one stop face each which in their interaction at least restrict the axial mobility of the dirt trapping part relative to the drive part during operation of the centrifuge.

114. (New) A free-jet centrifuge according to claim 113, wherein the drive part is secured against removal from the axis towards the top by means of a safety which is at least one of latched, clamped and screwed on the axis or one of provided and supported on the cover and the safety and the stop body are one of combined to and in one component.

115. (New) A free-jet centrifuge according to claim 77, wherein between an axial upper side of the dirt trapping part and an axial underside of the cover, an additional bearing in the form of a plain axial bearing is provided which at least restricts an axial mobility of the dirt trapping part relative to the drive part with the cover in place, and which takes up forces of the dirt trapping part which are directed axially towards the top.

116. (New) A free-jet centrifuge according to claim 77, wherein the dirt trapping part axially on an upper side and the cover axially on an underside comprise coupling means which are engageable and disengageable with each other which do not contact each other when the cover is placed on and which, when the cover is removed, will engage with and take along the dirt trapping part axially towards the top, by separating it from the drive part.

117. (New) A free-jet centrifuge according to claim 77, wherein the drive part and the dirt trapping part, in view of their parts interacting with the housing, comprise a forming and dimensioning which allow an installation of the drive unit and the dirt trapping part into existing centrifuges, hitherto provided with a conventional rotor.

118. (New) A free-jet centrifuge according to claim 98, wherein the dirt trapping part is free of metal and the plastic forming the dirt trapping part is a recycling plastic, and combustible with low to no pollutant emissions.

119. (New) A free-jet centrifuge according to claim 77, wherein a minimum pressure starting valve is arranged in a channel feeding the lubricating oil to the centrifuge, said valve only releasing an oil supply to the centrifuge after a predetermined oil pressure on an inlet side is exceeded.

120. (New) A free-jet centrifuge according to claim 77, wherein it is part of a module comprising at least one additional auxiliary unit of the internal combustion engine, the part being attached at a flange of the internal combustion engine.

121. (New) A free-jet centrifuge according to claim 120, wherein the centrifuge is operated in a bypass flow to an oil filter arranged in the main flow and the bypass flow flowing through the centrifuge comprises a maximum of 10% of the volume flow of the main flow.

122. (New) A free-jet centrifuge according to claim 77, wherein the centrifuge for the rotatable bearing of the rotor comprises a central axis which is hollow at least over one part of its length and forms a section of an oil feed channel; in this section, a valve body of a minimum pressure valve is axially movably provided, the valve body being pre-loaded in closing direction; the valve body protrudes from the axis and a sealing head of the valve body is located outside of the axis; and a valve seat interacting with the sealing head is formed on an axis-carrying centrifuge housing part through which the oil feed channel is running.

123. (New) A free-jet centrifuge according to claim 122, wherein the valve body is composed of several individual parts which are connected with each other, including the sealing head, a stem and a stem guide end piece.

124. (New) A free-jet centrifuge according to claim 122, wherein the valve body is composed of a single piece.

125. (New) A free-jet centrifuge according to claim 77, wherein the drive part comprises a central tubular body which, by forming a ring channel for an oil supply, surrounds at a distance a central axis on which the drive part is rotatably positioned and wherein, in an upper end area of the ring channel between an upper bearing of the drive part and an oil inlet of the dirt trapping part, a shielding ring is provided which is tied one of radially inside to the axis and radially outside to the tubular body.

126. (New) A free-jet centrifuge according to claim 77, wherein the centrifuge comprises a central hollow axis whose hollow interior forms, in a first axial area, a section of an oil feed channel and, in a second axial area, an oil outlet channel; wherein in the hollow interior of the axis, a first valve body, preloaded in closing direction, interacting with a valve seat, of a minimum pressure valve is provided axially movably to a limited extent; wherein an oil passage is formed in the valve body; and wherein a second valve body, preloaded in closing direction, of an overpressure shutdown valve interacts with the oil passage.

127. (New) A free-jet centrifuge according to claim 126, wherein preloading of the first valve body and of the second valve body in their closing direction is effected by a single spring.

128. (New) A free-jet centrifuge according to claim 126, wherein preloading of the first valve body and of the second valve body in their closing direction is effected by their own separate spring.

129. (New) A free-jet centrifuge according to claim 77, wherein the centrifuge comprises a central hollow axis whose hollow interior, in a first axial area, forms a section of the oil feed channel for the drive part and for the dirt trapping part and, in a second axial area, a section of the oil feed channel only for the dirt trapping part; wherein, in the hollow interior of the axis, a valve body, preloaded in closing direction, interacting with a valve seat, of a minimum pressure valve is provided being axially movable to a limited extent; and wherein, in the valve body, an oil passage with a defined cross-section is formed whose orifice on the sealing seat side is located radially outside and downstream of the sealing contour of the valve body interacting with the sealing seat.

130. (New) A free-jet centrifuge according to claim 77, wherein the centrifuge comprises a central hollow axis whose hollow interior, in a first axial area, forms a section of the oil feed channel for the drive part and for the dirt trapping part and, in a second axial area, a section of the oil feed channel only for the dirt trapping part; wherein, in the hollow interior of the axis, a valve body, preloaded in closing direction, interacting with a valve seat, of a minimum pressure valve is provided being axially movable to a limited extent; and wherein, between an outer circumference of the valve body and an inner circumference of the hollow axis, an oil passage with a defined cross-section is formed whose orifice on a sealing seat side

is located radially outside and downstream of the sealing contour of the valve body interacting with the sealing seat.

131. (New) A free-jet centrifuge according to claim 77, wherein the bottom of the dirt trapping part is provided with openings distributed in radial and circumferential direction and under the perforated bottom in an axial distance from it and above the nozzles, a closed shielding disk is provided which is part of the drive part, or wherein in the dirt trapping part above a closed bottom thereof, an intermediate bottom is provided which has openings distributed in radial and circumferential direction.

132. (New) A free-jet centrifuge according to claim 131, wherein the bottom or the intermediate bottom provided with the openings is designed as a perforated plate or a screen plate.

133. (New) A free-jet centrifuge according to claim 131, wherein a layer of oil-permeable material is placed onto the bottom or the intermediate bottom, covering up its openings.

134. (New) A free-jet centrifuge according to claim 77, wherein two shielding disks are provided one over the other, radially outside of a clean oil outlet of the dirt trapping part, on an upper side of a centrifuge housing part located under the rotor, with the pressureless partial lubricating oil flow coming from the clean oil outlet flowing off between the lower shielding disk and the centrifuge housing part located thereunder, and with the fast flowing partial lubricating oil flow, exiting from the recoil nozzles of the drive part, being discharged between the lower shielding disk and the upper shielding disk.

135. (New) A free-jet centrifuge according to claim 77, wherein a central axis serving for the rotatable bearing of the rotor is designed as one single piece with a part of the centrifuge housing located under the rotor.

136. (New) A free-jet centrifuge according to claim 77, wherein at least one bearing sleeve is set onto an outside of a central axis serving for the rotatable bearing of the rotor, the sleeve being of a material forming a favorable sliding fit with at least one bearing bush in the rotor.

137. (New) A free-jet centrifuge according to claim 136, wherein the bearing sleeve, after being set down onto the axis, is finished on its outer circumference by grinding.

138. (New) A free-jet centrifuge according to claim 77, wherein the drive part of the rotor is designed with a central tubular body through which the lubricating oil to be cleaned is fed to the dirt trapping part; wherein in an upper end area of the tubular body, at least one opening running in radial direction is provided as an oil inlet to the dirt trapping part; wherein by forming an annular gap space on the outer circumference of the upper end area of the tubular body, a sleeve-form collar is provided which is closed axially on the bottom and radially on the outside and opened axially on the top; and wherein the oil inlet discharges into the lower part of the annular gap space.

139. (New) A free-jet centrifuge according to claim 77, wherein the drive part of the rotor is designed with a central tubular body which forms a shaft for the rotatable bearing of the rotor; the tubular body is provided on bearings on the bottom and the top of housing parts of the centrifuge; a friction bearing is provided as the lower bearing which is formed by a bearing bush inserted in the housing part located under the rotor and a bearing part inserted into the bearing bush provided on the bottom end of the tubular body; and, as an upper bearing, a rolling bearing is provided which is arranged between the upper end of the tubular body and a housing part, especially cover, which is located above the rotor.

140. (New) A free-jet centrifuge according to claim 139, wherein the tubular body forming the shaft for the rotatable bearing of the rotor is provided with axial clearance and the size of a lower front face of the tubular body or of the bearing part is dimensioned subject to the oil pressure prevailing during operation of the centrifuge such that an axial force caused by the oil pressure, acting on the rotor towards the top is essentially equivalent to an axial weight force of the rotor acting towards the bottom.

141. (New) A free-jet centrifuge according to claim 77, wherein the drive part of the rotor is designed with a central tubular body which forms a shaft for the rotatable bearing of the rotor, and the tubular body is run on bearings only on the bottom of a housing part of the centrifuge located under the rotor, by means of two bearings axially spaced from each other.

142. (New) A free-jet centrifuge according to claim 141, wherein the lower bearing is provided as a friction bearing which is formed by a bearing bush inserted into the housing part located under the rotor and by a bearing part provided on a lower end of the tubular body and inserted into the bearing bush; and a rolling bearing is provided as an upper bearing which, seen in radial direction, is arranged between the bearing part of the tubular body and the housing part located under the rotor.

143. (New) A free-jet centrifuge according to claim 77, wherein the centrifuge is designed with a housing-stationary central axis, and the drive part of the rotor with a central tubular body surrounding the axis at a distance; wherein, through a ring channel between axis and tubular body, the lubricating oil to be cleaned is fed to the dirt trapping part; and wherein on the inner circumference of the tubular body, ribs running in axial direction are arranged, extending radially towards the inside into an annular gap space.

144. (New) A free-jet centrifuge according to claim 77, wherein the centrifuge is designed with a housing-stationary central axis, and the drive part of the rotor with a central tubular body surrounding the axis at a distance; wherein the lubricating oil is fed to the centrifuge through a hollow lower section of the central axis; wherein, through a ring channel between axis and tubular body, a partial flow forming the lubricating oil to be cleaned is fed to the dirt trapping part; wherein a friction bearing bush provided at the lower end of the tubular body is run on bearings on the hollow lower section of the central axis and wherein the upwardly directed front face of the bearing bush is designed as a valve seat for a valve body, axially movable in the tubular body, preloaded in closing direction, of a minimum pressure valve.

145. (New) A free-jet centrifuge according to claim 77, wherein the centrifuge is designed with a housing-stationary central axis, and the drive part of the rotor with a central tubular body surrounding the axis at a distance; wherein the lubricating oil is fed to the centrifuge through a hollow lower section of the central axis; wherein, through a ring channel between axis and tubular body, a partial flow forming the lubricating oil to be cleaned is fed to the dirt trapping part; wherein a friction bearing bush provided at a lower end of the tubular body is run on bearings on the hollow lower section of the central axis; wherein the axis at the level of the upper end of the bearing bush comprises a radially outwardly

projecting step; and wherein the upwardly directed front faces of the bearing bush and of the step are jointly designed as a valve seat for a valve body, axially movable in the tubular body, preloaded in closing direction, of a minimum pressure valve, with the valve body in its closed position sealingly covering a bearing gap between the axis and the bearing bush.

146. (New) A free-jet centrifuge according to claim 144, wherein the valve body is hollow and carried on the axis; the axis, in its area carrying the valve body, comprises a section of a larger outer diameter and above that a section of a smaller outer diameter, and the valve body on its inner circumference comprises a sealing contour or a seal which seals off against the section of the larger outer diameter and has a radial distance to the section of the smaller outer diameter.

147. (New) A free-jet centrifuge according to claim 77, wherein the means provided or applied in the centrifuge, which, in the operation of the centrifuge, serve to prevent or restrict the axial mobility of the dirt trapping part relative to the drive part and which are detachable when the cover is removed, are formed by latching tongues with latching noses arranged on the dirt trapping part or on the drive part which are interacting with latching recesses provided on the drive part or on the dirt trapping part.

148. (New) A free-jet centrifuge according to claim 147, wherein the latching tongues are provided on the top and radially inside, as well as downwardly directed on the dirt trapping part and the latching recesses are provided on the top and radially inside on the drive part.

149. (New) A free-jet centrifuge according to claim 147, wherein the latching tongues swivel about a swivel axis; the latching tongues are formed with an upwardly directed and protruding activation end; and by swiveling the activation end radially towards the inside, the respectively associated latching tongue swivels with its latching nose radially outwardly and thus is disengageable with its latching recess.

150. (New) A free-jet centrifuge according to claim 122, wherein the drive part comprises a metal, and the dirt trapping part comprises a plastic.

151. (New) A free-jet centrifuge according to claim 77, wherein in an upper area of the dirt trapping part from its center, upon rotation of the rotor in radial direction, outwardly pointing flexible hose arms or articulated tubular arms are provided as an oil inlet.

152. (New) A free-jet centrifuge according to claim 77, wherein in an upper area of the dirt trapping part, from its center, outwardly extending rigid tubular arms are provided, with holes as an oil inlet provided over their length.